6. Geology / Landforms

Setting

The following Setting section is based on information in the Open Space Conservation Element report prepared by the Placer County Resource Conservation District.

Overview of Area Geology. The City of Auburn General Plan area lies within the mother lode belt of the Western Sierra Nevada foothills. The terrain is steep to gently rolling. The Plan area is bordered on the southeast by the North Fork of the American River and the north by Dry Creek Road. The slopes found on the American River Canyon walls are steep to very steep. To the north of the Plan area is the 200- to 400-foot deep canyon of the Bear River.

The City of Auburn lies within the metamorphic terrain between these two canyons. The land slopes gently to the southwest from a high of approximately 1540 just north of the airport to a low of 1100 feet in the southwest, above Newcastle.

Drainage is well integrated to a few major streams that flow generally westward across the metamorphic structure. Most of the former elongated northwest-southeast ridges have been dissected into isolated irregular hills, peak sand knobs. Duncan Hill in the southwest and the irregular ridge south of Dry Creek are examples.

In general, the Plan area hills slope directly to an adjacent stream or drainage channels without any intervening floodplain. The streams are eroding bedrock in their downcutting stage; as a result, stream channel deposits of sand and gravel are sparse and insufficient as a resource. Flood plains are very narrow, on the order of 8- to 20-feet, and generally well marked. Terrace deposits of sand and gravel that mark an ancient higher stand of the stream are sparse and very narrow except in some locations such as along Millertown Road near a tributary to North Ravine.

Geologic formations consist mostly of metamorphic rock units. The majority of this rock consists of hard metavolcanic flows, or "greenstone," which contains numerous, thin, discontinuous bands of soft metavolcanic tufts and soft- to-hard metasedimentary beds. The last group, occurs commonly in the Auburn area and consists of metasandstone, metashale, cherty limestone and slate (see Figure 6-1).

A highly irregular zone of serpentine extends from Auburn along Highway 49. Granitic rock units occur in the northeast and southwest corners of the planning area.

Sedimentary rock units consist of the Mehrten Conglomerate, a channel gravel of an ancestral American River that has been cemented, weathered, and extensively eroded since it was uplifted to its present position. Only a few remnants of the

river channel remain north of Auburn. The major deposit extends from Skyridge along Indian Ridge.

Three types of surficial deposits are found in the Plan area. They consist of Stream Channel Deposits of gravel along the North Fork of the American River; Terrace Deposits of sand and gravel that indicate former higher stands of streams that drain the area; and Landslide Deposits that are mostly inactive and occur along the steep canyon slopes of the American River.

Rock/Deposit Units. The various rock units are described more specifically below.

— **Stream Channel Deposits.** Stream Channel Deposits are unconsolidated sand and gravel deposits that occur within the flood limits of streams and rivers. Those of economic significance occur in the North Fork of the American River.

Most streams within the planning area are flowing and downcutting on exposed bedrock. Stream Channel Deposits of sand and gravel are not now being formed because of the limited erosion supply and the high gradient and high flood velocities which flush any coarse material out of the area during winter storms.

— **Terrace Deposits.** Terrace Deposits are those unconsolidated to semi-consolidated deposits of sand and gravel that occur higher and bordering present stream channels, or filling former stream channels. The upper surface of these deposits are generally planar and nearly horizontal unless they have been disturbed by placer mining or erosion. They are highly favored as building sites because the upper surface is nearly level, percolation rates for septic tanks are low, they contain adequate quantities of shallow groundwater for wells, and they are scenic areas generally with a flowing stream and dense oak cover.

Drawbacks occur because septic tank effluent may percolate readily to the stream, the septic systems may be flooded during high groundwater periods, and the effluent may contaminate the stream and wells downstream from the source.

Terrace Deposits in the Auburn Plan area are limited in extent. Adjacent to Dry Creek at the edge of the proposed Sphere of Influence and along Millertown Road.

— **Landslide Deposits.** Landslide Deposits are jumbled mixtures of rock fragments in a dark red soil matrix that are elongated downslope. The only known example occurs along Highway 49 midway between Auburn and the North Fork bridge.

Inactive Landslide Deposits are common along the steep slopes of the American River canyon. Many have been mapped by geologists of the United States Bureau of Reclamation as part of their investigations for the proposed Auburn reservoir. These slopes can present foundation support problems and require stability investigation prior to development.

- **Sedimentary Rock Units**. The Mehrten Conglomerate is an ancient river channel gravel that has been extensively eroded; as a result, few remnants occur north of Auburn. Remnants of one channel occur north and south of Rock Creek Lake. Remnants of another channel occur at Channel Hill, north of Auburn across I-80 from the California Division of Forestry headquarters, and another one-half mile northeast of the first. The largest deposit in the area occurs capping the ridge that extends from Skyridge in Auburn along Indian Ridge.

  Gold was mined in the past at many locations from small drifts that were excavated along the base contact of this deposit. A number of these drifts extend under the Skyridge area. The largest underground workings are those of the Banner Mine located southeast of Skyridge.

  The conglomerate consists of moderately to well-cemented volcanic cobbles mostly less than six inches, but boulders up to four feet in diameter occur locally. Maximum thickness of the deposit is over 1000 feet, but generally the thickness is about 50 feet. Stability is very good in steep excavations unless the material is saturated; which can result in small slumps.

- **Volcanic Rock Units** The Mehrten Mudflow Breccia is a volcanic mudflow that erupted from vents east of the present crest of the Sierra Nevada approximately seven to ten million years ago. The mudflows flowed westward along the river channels that were filled with gravels of the Mehrten Conglomerate. When the channels were filled with volcanic debris, the flows probably spread across the landscape until much of the surface was covered with the mudflow. Uplift and continuous erosion since that time have left remnants as caprock on isolated hills and ridges.

  The Mudflow Breccia is light lavender, composed of hard unweathered andesite with large angular and rounded andesite blocks. Soil development on the unit is very thin. Grass cover is sparse. The material is impermeable, although surface water can travel down open vertical joints to the underlying conglomerate. Excavation of the unit is very difficult and blasting is often necessary. Total thickness of the unit in this area varies from 10- to 20-feet. Stability of the unit is very high in near-vertical excavations.

- **Granitic Rock Units** Granitic material extends 1-1/2 miles north of Indian Ridge where it comes in contact with the metavolcanic flows into which it was intruded as a molten mass about 135 million years ago.

  Most of the speckled granitic rock, quartz diorite, in the vicinity of Newcastle and Ophir is intensely weathered to decomposed at the surface. Large to small outcrops and residual boulders of lightly weathered quartz diorite occur scattered throughout the area. Outcrops are particularly dense along Auburn Ravine where the weathered material has been stripped away by erosion. Natural soil development varies from 0.5- to 1.5-feet thick, and is thinnest on slopes of hills, intermediate on tops of hills or ridges, and thickest in low areas and drainage swales.

The unweathered granitic mass is moderately fractured by numerous joints. Spacing between joint planes varies from 0.5- to 5.0-feet. Another less continuous and frequent vertical set occurs at right angles to the major set. Numerous flat to moderately dipping joints contribute to fracturing of the rock mass.

Decomposed granitic material is readily excavated to shallow depths with light equipment. The depth to sound hard rock varies from a few feet to 50 feet, and generally is greater than 20 feet. Outcrops usually require blasting to remove, although bulldozers may do the job where the rock is jointed into discrete blocks. However, wet and saturated material readily slumps back to slopes of 1:1 or slightly flatter. Permanent excavation slopes should be graded at 1 - 1.5:1 or flatter for long-range stability.

Weathered granitic material ravels and erodes easily even on gentle slopes due to runoff from rainfall or sprinklers. Gullies and rills rapidly form.

— **Metamorphic Rock Units.** Metamorphic rocks were deposited as horizontal sedimentary and volcanic beds in a marine environment that covered the present Sierra Nevada region between 140 and 300 million years ago. The area underwent a regional east-west compression that folded, crushed, and faulted the beds to their present vertical position. Serpentines were intruded along major north-south fault zones (Melones, Bear Mountain). Granitic masses were intruded into the metamorphic beds starting approximately 135 million years ago. This further crushed the metamorphic rocks and numerous moderately dipping reverse shear zones were formed. The major vertical fault zones and the metamorphic rocks terminate at the borders of the granitic rock masses which is evidence that those zones of movement became inactive during or before the intrusion of granite and have remained in that state since.

— **Metavolcanic Flows.** The majority of the rock in the vicinity of Auburn consists of metavolcanic flows, volcanic lava flows that were altered in form and composition (metamorphosed) by the regional compression and crushing. This material is commonly referred to as "greenstone" for its dark green color. Amphibolite is a well-foliated thick-platy variety of metavolcanic flows that occurs in the vicinity and west of Auburn. Well drillers and contractors generally refer to this material as "blue diorite", although the unweathered color is black-green that appears gray-blue in outcrop. Metavolcanic tuffs are a soft, thick-platy variety of rock that originally were deposited as volcanic ash beds in the marine environment. These were interbedded with the flows. Only the larger units are shown on the geologic map.

Rock at the surface is generally intensely weathered to a red-orange color and opened up along all fracture surfaces by the weathering action. Intense weathering penetrates to depths of 5- to 30-feet. Groundwater travels mostly along openings that are located within quartz veins that occur in cross-cutting shear zones.

Soil profiles developed on the surface of metavolcanic flows generally are on the order of 1- to 1.5 feet thick. The material is an iron-rich red to brown silt containing varying percentages of hard small fragments from the underlying weathered rock.

Stability of the weathered and fresh material depends chiefly on the orientation of fracture surfaces in relation to the orientation of excavation or natural slopes. It is recommended that slopes in the weathered material be excavated at 2:1 or flatter.

- Serpentine. Serpentine, the state rock of California, occurs in an irregular zone along Highway 49 throughout the Plan area. Color varies from light to very dark green. The material is mostly intensely fractured into small lens-shaped fragments with polished slicken-sided surfaces. The rock is hard, although easily excavated where fractured. Some areas of massive lightly fractured rock require blasting. Shear zones which are common within the unit appear as brown-green steeply dipping soil zones similar to fault zones along the borders. Talc schist and chlorite schist commonly occur within the border faults in the vicinity of Auburn.

  Very thin to no soil is formed on the upper surface of serpentine. Sparse grass and brush grow in soil that develops along the fractures.

  Stability of the material in excavations depends upon the density of fractures. Intensely fractured material will contract and expand in new excavations because the serpentine mineral structure gives up or takes on water depending on the atmosphere. Material separation and small-scale slumps are common in highway excavations. Examples are cut-slopes on the west side of Highway 49 between Palm Avenue and Nevada Street that had to be resloped because of continuous slumps in the fractured serpentine.

Area Soils. The General Plan Conservation and Open Space Element notes that the Plan area contains 52 individual soil types, as categorized by the USDA Soil Conservation Service report on Western Placer County, dated July 1980 (see Figure 6-1). Each of these soil types is assigned to one of eight capability classes as related to standard agricultural practices. These qualities also indicate soils well suited to urban uses, due to their lack of limitations on construction and septic disposal requirements. The Plan area, the report notes, contains limited Class I and II soils, the best classification for agriculture. However, the determination of land use is very competitive, and an agricultural or urban determination is only generally based upon soil limitation. Slopes in the Plan area are mostly in the 5% to 15% range, but 30% and greater slopes are present in areas along the American River canyon and along Indian Hill Road and other areas(see Figure 6-2). Soil depth is shallow in most parts of the Plan area, averaging 12- to 40-inches. All soils in the Plan area receive an average of 22- to 35-inches of rainfall yearly.

The Placer County Resource Conservation report lists soil series in the Plan area as consisting of the following:

- Andregg Series. Andregg soils, formed in upland, are moderately deep well-drained soils underlain by weathered granitic bedrock. These soils are found

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at elevations between 200 and 1000 feet and have slopes that vary between 2 and 50%. Natural vegetation include annual grasses, forbs, blue and live oak, as well as scattered pine.

Permeability is moderately rapid and the available water capacity is 2.5- to 5.0-inches. Effective rooting depth varies from 20- to 60-inches. Surface runoff of winter precipitation is medium.

- Auburn Series Auburn soil is a shallow and moderately deep well-drained soil underlain by vertically tilted metamorphic rock. It is formed in residuum of undulating to rolling foothills, generally west of Auburn. Elevations are 200- to 1600-feet. Native vegetation is annual grasses, forbs, blue and live oaks and scattered pines.

  Permeability is moderate. The available water holding capacity is 2- to 4-inches. The effective rooting depth is 12- to 28-inches. Surface runoff is medium and the erosion hazard is slight to moderate. The soil will become saturated and water will flow across the surface for short periods of time following intense rainstorms.

- Boomer Series . Boomer soil is deep, and well-drained and underlain by weathered metabasic bedrock. It is formed in residuum on undulating to rolling ridges and foot slopes. Elevations are 1000- to 2000-feet. Native vegetation is conifer-hardwood forest with some annual and perennial grasses. Permeability is moderately slow. The available water holding capacity is 5- to 8-inches. The effective rooting depth is 40- to 60-inches. The surface runoff is medium and the erosion hazard is slight to moderate when the soil is bare.

- Caperton Series Caperton soil is a shallow, somewhat excessively drained soil underlain by granitic rock. It is formed in residuum on undulating to hilly slopes in the Folsom Lake-Loomis Basin areas. Elevations are 200- to 1000-feet. Native vegetation is annual grasses, forbs, blue and live oaks with some scattered areas of brush. Permeability is moderately rapid. The available water holding capacity is 1- to 2-inches. The effective rooting depth is 6- to 20-inches. The surface runoff is medium to rapid and the erosion hazard is moderate to high. On slopes less than 20%, the soil will become saturated for short periods of time following intense rainstorms.

- Exchequer Series Exchequer soil is a shallow, brown, well-drained very stony soil underlain by hard andesitic breccia. It is formed in residuum on broad, elongated volcanic ridges at elevations of 100- to 1000-feet. Native vegetation is annual grasses and forbs, with scattered blue and live oaks. Permeability is moderate. Available water-holding capacity is 1- to 2.5 inches. The effective rooting depth is 8- to 20-inches. The surface runoff is medium and the erosion hazard is slight to moderate. This soil will become saturated and water will flow across the surface for short periods of time following intense rainstorms.

- Henneke Series. The Henneke Series is on rolling to steep serpentinized foothills in discontinuous belts from Auburn, North to Orr Creek, along the

east side of State Route 49. Elevations are 1200- to 1700-feet. The Henneke soil makes up about 60% and Serpentine rock outcrop about 20% of this complex. Native vegetation is poor annual grasses, forbs, and chamise, with scattered Digger pine. The Henneke soil is shallow, well-drained soil formed in residuum from hard serpentinized rock.

Permeability is moderately slow. Available water holding capacity is 1.5- to 2.5-inches. The effective rooting depth is 10- to 20-inches. Fertility is very low due to a calcium to magnesium imbalance. The surface runoff is medium to rapid an the erosion hazard is high.

- **Inks Series.** Inks soil is a shallow, well-drained cobbly soil underlain by andesitic conglomerate. It is formed in residuum on broad elongated volcanic ridges and their side slopes at elevations of 200- to 1200-feet. Native vegetation is annual grasses, forbs, and blue and live oaks. Typically, the surface layer is yellowish brown loam about five inches thick. The subsoil is brown cobbly clay loam underlain at about 18-inches by andesitic conglomerate.

  Permeability is moderate. The available water holding capacity is 1- to 2.5-inches. The effective rooting depth is 12- to 20-inches. Under bare soil conditions, surface runoff is medium to rapid and the erosion hazard is sight to high.

- **Josephine Series.** Josephine soil is a deep, well-drained soil underlain by weathered metamorphic rock. It is formed in residuum from metasedimentary rock, on undulating to gently rolling ridges or foot slopes at elevations to 4000 feet. Native vegetation is conifer-hardwood forest with some brush, forbs and grasses. Permeability is moderately slow. Available water holding capacity is 6.0- to 10-inches. The effective rooting depth is 40- to 60-inches. The surface runoff is medium and the erosion hazard is slight when this soil is bare.

- **Mariposa Series** Mariposa soil is a shallow to moderately deep, well-drained gravelly soil underlain by fractured vertically tilted schists and slates. It is formed in residuum from metasedimentary rock, on rolling to hilly uplands at elevations to 3500-feet. The native vegetation is conifer-hardwood forest with scattered areas of brush and grass. Permeability is moderate. Available water holding capacity is 1.5- to 4.0-inches. The effective rooting depth is 15- to 35-inches. The surface runoff is medium to rapid and the erosion hazard is moderate to high.

- **Pits and Dumps** Pits and dumps consist of sand and gravel pits, refuse dumps, and rock quarries. These areas are typically barren. The natural drainage, permeability, erosion hazard, runoff and available water holding capacity all vary.

- **Riverwash** Riverwash occurs in and along channels of the American River. The material is highly stratified stony and bouldery sand that is typically barren. It is inundated yearly by floodwater. About 50% is covered with water. Riverwash is subject to scouring or cutting as well as to deposition

depending on riverflow and bedload. Included are areas of tailings. Permeability is very rapid. The available water capacity and drainage are variable. Surface runoff is rapid. The hazard of erosion is very high.

- Rock Outcrop. Rock outcrops occur in areas of highly resistant metamorphic rock, andesitic rock, serpentine rock and syenite rock formations. It occurs mainly on steep and very steep slopes that break into the major drainage-ways. At the lower elevations, it generally is associated with Auburn soils and at the higher elevations, with the Boomer variant, Dubekella, Mariposa, and Maymen soils. These areas are essentially barren with limited grasses, browse and stunted trees.

  Rock outcrops and stones occupy from 50- to 90-percent of the surface, the remainder is a thin mantle of soil material. The drainage is excessive and the runoff is very rapid. The erosion hazard is none to slight. This land is used for watershed.

- Rubble Land. Tailing consists of cobbly and stony mine debris from dredge mining, hydraulic mining and hardrock mine dumps. This land is essentially barren with limited grasses and brush. At higher elevations, non-commercial stands of conifers are regenerating. Nearly all soil material has either been washed away as in hydraulic mining, or buried, as in dredge mining or mine dumps. This land is used as a watershed and wildlife. Some areas are used for source of aggregate.

- Sierra Series. Sierra soil is a deep, well drained soil underlain by weathered granitic rock. It is formed in residuum on gently rolling low foothills at elevations of 200- to 1000-feet. The native vegetation is annual grasses, forbs, blue and live oaks and scattered pines.

Impacts

1. **Landform disturbance. Introduction** – In general, the impact discussions in this section apply to existing City limits, the existing Sphere of Influence, and proposed additions to the Sphere of Influence. This is because similar topography and conditions exist throughout the area. However, where appropriate, impacts are separated by location within the three subareas.

   IMPACT EVALUATION CRITERIA: ***Development-associated grading can result in significant, adverse impacts if it results in unsightly cuts and fills, erosion, or slope instability.***

   In addition, the following excerpts are Plan goals, policies, and implementation measures related to geology and landforms issues:

Table 6-1
AUBURN GENERAL PLAN
GEOLOGY/LANDFORM RELATED GOALS, POLICIES AND IMPLEMENTATION MEASURES

LAND USE ELEMENT

General

Goal 1: Guide development in a pattern that will minimize land use conflicts between adjacent land users.

Policy
1.1 Design industrial/commercial business uses to be compatible with adjacent land uses, including, but not limited to, siting, height, orientation, materials, landscaping, circulation, grading, setbacks proportion, and architecture.

Goal 2: Encourage maintaining the open rural character of the County areas beyond the City of Auburn Sphere of Influence so that Auburn is a distinct, readily identifiable foothill community. Encourage farmsteads, orchards, tree farms, grading, and horse ranches.

Policy
2.1 Actively promote and preserve agricultural use on lands in the regional area.

Goal 3: Guide development so that it takes advantage of Auburn's unique character including, but not limited to, terrain and vegetation.

Policies
3.1 Minimize disturbance to terrain by limiting "pads" on steep slopes to reduce cut and fill.

3.2 Minimize disturbance to terrain by encouraging that roads follow the existing topography.

3.4 Develop, adopt, and implement a hillside development ordinance.

Commercial

Policies
6.2 Encourage commercial design that utilizes existing topography, minimizing cut and fill.

Industrial

Goal 8: Provide for the development of industrial areas where suitable land and services exist and with a minimum of land use conflicts.

Implementation
A. The City shall prepare design guidelines for commercial and industrial development proposals.

B. The City shall prepare and adopt a Hillside Development Ordinance to address disturbance to the terrain, including elements such as "pads" on steep slopes, roads to follow topography, and fencing on steep slopes.

Cont. . . .

CONSERVATION ELEMENT

Goal 1: Preserve areas of natural vegetation, trees, topographic features, wildlife habitat, and riparian corridors.

Goal 2: Minimize adverse development impacts to the natural environment.

Policies

2.1 Develop, adopt and implement a Hillside Development Ordinance (LU 3.4).

2.2 Continue to implement the grading ordinance of the City of Auburn to protect against sedimentation and soil erosion.

2.6 Encourage development of all building sites and residences in a manner minimizing disturbance to natural terrain and vegetation and maximizing preservation of natural beauty and open space.

Goal 4: Provide for the conservation, utilization, and development of mineral, geologic and soil resources in keeping with sound conservation and reclamation practices.

Policies

4.1 The City should identify all economically valuable resources, including mineral deposits, soils conducive to agricultural uses, and those open space areas which add to the overall attractiveness of the region.

4.2 Consider the limitations of geological formations in the design and siting of buildings, roads, and utilities.

Goal 6: Protect visual resources.

Policy

6.5 Encourage and use existing City and County programs for protection and enhancement of scenic corridors, including, but not limited to, design review, sign control, landscaping and mounding undergrounding utilities, scenic setbacks, density limitations, plant unit developments, grading and tree removal standards, open space easements, and land conservation contracts.

Goal 7: Conserve, protect and enhance water supplies and adequately plan for the development and protection of these resources and their related resources for future generations.

Policies

7.4 Adopt an ordinance to protect and enhance waterways, stream channels, and intermittent streams.

7.5 Where feasible, keep waterways in their natural state, rather than concrete-lined or placed underground.

7.6 Encourage appropriate setbacks for building sites from natural waterways.

Implementation

C. The City shall adopt a stream, canal and waterway protection ordinance.

G. The City shall include measures to protect visual resources along scenic

SAFETY ELEMENT

Goal 3: Minimize hazards to public health, safety, and welfare resulting from natural and man-made hazards.

Policies

3.5 Ensure compatible development in both man-made and natural high-hazard areas (e.g., aircraft safety zones, active fault zones, slide-prone hillsides) and prohibit development of critical facilities such as police, fire and health facilities in these areas.

3.6 Prior to approval of development in high hazard areas, require the design of mitigation measures to the satisfaction of the City Engineer, Community Development Department, and Police and Fire Departments.

Implementation

J. The City shall require all new buildings to be constructed to the Unified Building Code standards for protection from seismic events.

An inevitable result of the development of rural land is the disturbance of existing landforms. The City of Auburn Plan area contains a wide range of undeveloped and lightly-developed landforms, from narrow ravines to expansive hillsides. Some of these landforms are visible at varying distances from many parts of the City, and combine to create the character of Auburn and its surroundings. As development extends further from its "core", it can be expected to impact areas having greater constraints than those on previously-developed areas.

The City of Auburn General Plan provides direction intended to avoid grading and landform disturbance impacts via goals, policies, programs, and standards listed in the text of the Plan as well as via the choice of land uses prescribed for areas of varying constraint severity.

The particularly relevant goals, policies, and programs are listed in Table 6-1 However, in general, issues addressed include:

- Continued implementation of the City of Auburn grading ordinance;
- Guiding development types into areas appropriate and compatible for these operations, including suitability of native terrain and vegetation;
- Limiting pad grading on steep slopes;
- Encouraging roadways that follow existing topography;
- Protection of ridge tops;
- Recommended development of Commercial/Industrial Design Guidelines;
- Encourage commercial design that utilizes existing topography and minimizes cuts and fills;

- Protection of scenic corridors;
- Waterway preservation and enhancement, including preservation in a natural state and development of a guiding ordinance;
- Recommended development of a tree ordinance;
- Recommended development of an ordinance governing development on hillsides.

Taken together, these goals, policies and implementations are capable of restricting the degree to which future development will alter the native landform of the Plan area. Implemented as a part of the approval process, they can be expected to guide future development proposals toward more site-adaptive designs than have been previously constructed within the Plan area.

Critical to the success of these measures will be the specific details of the hillside development and tree ordinances, which are yet to be developed, and the degree to which these and other measures can be expected to be implemented, both within the City limits and within the Sphere of Influence. These ordinances proposed as a part of the Plan, can be highly effective tools for restricting landform disturbance in hilly areas, through disturbance thresholds and tree loss restrictions. It is important that ordinances be developed for various categories of slope severity, to control the degree of disturbance which can occur in areas having high topographic sensitivity.

Implementation Issues ~ For projects which require discretionary approval, such as commercial or industrial developments, implementation of ordinances can be generally assured. However, a significant amount of grading can occur without such approvals. Individual residential development and other grading operations without land use applications can easily fall below the current level of grading disturbance needed to require a grading permit and subsequent review.

For example, projects currently will be unreviewed which will not displace over 50 cubic yards of soil (the equivalent of approximately 4 double hopper trucks) or remove vegetation above the following levels:

$\geq$ 10% slopes — $\leq$ 5,000 sq.ft.
$<$ 10% slopes — $<$ 10,000 sq.ft.

Within the context of an urbanized setting (smaller lots), these unreviewed projects combined with those requiring discretionary permits which cannot be fully mitigated could result in significant impacts to area landforms.

Compatibility of proposed land use densities with landforms/ slopes ~ A parallel issue affecting alteration of landforms is the range of land uses and densities proposed for steep and erodible slopes within the Plan area.

Large-footprint high-density residential and commercial/industrial uses do not lend themselves to steep slopes. This is because of the large vertical and/or

horizontal cuts and fills required to provide needed single-level pads, as shown in Table 6-2 below.

Table 6-2
ESTIMATED GRADING IMPACTS FOR LARGE-FOOTPRINT STRUCTURES AT VARIOUS SLOPES*

	..... TOTAL COMBINED CUT & FILL REQUIRED		
	75-Foot Pad Dimension	150-Foot Pad Dimension	500-Foot Pad Dimension
Slope of land	(Vertical ft)	(Vertical Ft)	(Vertical Ft)
2% Slope	1.5	3.0	10.0
4% Slope	3.0	6.0	20.0
8% Slope	6.0	12.0	40.0
12% Slope	9.0	18.0	60.0
16% Slope	12.0	24.0	80.0
24% Slope	18.0	36.0	120.0

** This table compares combined cut and/or fill depths generated when slopes of various degrees are pad graded for development. The pad dimensions shown reflect the horizontal distance of the pad, running perpendicular to existing slope contours.*

As a general rule, slopes above 30% are difficult to build structures and roads of any description on without resulting in significant grading impacts. Many communities prohibit development on slopes in excess of 30%.

Below 30%, however, the severity of landform impacts depends upon two closely related aspects of design:

- The size of the proposed structure's single-level footprint (or combined footprints at or near a single pad elevation)

  and/or

- The amount of pad grading required to obtain parking, vehicular circulation or level floor requirements, dictated by the foundation design.

As Table 6-2 above illustrates, large industrial buildings on a single-level pad grade will require very large cuts and fills, even on modest slopes. The proposed Land Use Plan shows areas of industrial and commercial development, bordering Highway 49 on slopes ranging from 5- to 15%, and an area east of Interstate 80 along the railroad right-of-way, in areas of 15- to 30% slopes. If new industrial structures in these areas are permitted to become too large, extreme cut and fill impacts will occur within these scenic highway viewsheds and/or to neighboring residential areas. For example, a 300-foot pad (dimension that runs perpendicular to slope contours) not uncommon in industrial sites, on a 15% slope can yield a 45-foot combined vertical cut and fill. Cut and fills of this magnitude would be visually inconsistent with their surroundings and cuts could be very difficult or impossible to adequately revegetate because of underlying rock exposure.

Of particular concern are the following areas:

Table 6-3
PLAN AREA CUT/FILL AREAS OF CONCERN

Location #	Location	Designation	Concern
Within City Limits			
1	Auburn Folsom Rd at Maidu	Mixed Use	Potential for pads or large footprint commercial - high density residential mix on moderate to steep slopes (5-15%)
2	Area between Hwy 49 and Nevada St north of Palm Avenue	Mixed Use	Potential for large pads for large footprint structures on moderate to steep slopes (5-15%)
9	Indian Hill Road	Mixed Use	Potential for High Density residential development on 5-15% slopes.
Outside City Limits, Within Existing Sphere of Influence			
3	East side of Highway 49 between Bell and Dry Cr. Roads	Industrial/Commercial; Mixed Use	Potential for large structures on moderate to steep slopes (5-15%)
4	Southwest of the Bowman undercrossing interchange along I-80	Industrial/Commercial	Potential for large structures on moderate to steep slopes (5-15%)
5	East of Highway 49 at Marguerite Mine Road (Chevreaux area)	Industrial	Potential for large structures on moderate to steep slopes (10-30%)
6	Bell Road and New Airport Rd	Industrial	Potential for large structures on moderate to steep slopes (5-15%)
Within New Sphere of Influence			
7	East of I-80/Bell Road interchange along railroad tracks	Industrial	Potential for large structures on moderate to steep slopes (5-30%)
8	North and south of Ophir Rd	Industrial	Potential for large structures on moderate to steep slopes (5-30%)

It is important that these areas be addressed on a case-by-case basis, to assure that new building pad dimensions are tailored to individual site slopes.

Many of the topographically-significant areas within the proposed Sphere of Influence are devoted to rural residential subdivisions of one or more dwelling units per acre. Subdivisions in these areas must rely on provisions of the City of Auburn Grading Ordinance, in combination with the required hillside development ordinance and tree ordinance, to avoid significant impacts. However, it is important to note that significant impact can occur from small-lot developments, as well as from the large-footprint structures previously discussed, if the land slope is steep. Using a typical 2500 to 3000 square foot residence as a model, an expected 3000 to 3500 square feet of grading will be required for conventional foundation construction on relatively flat land (below 12%). Site adaptive construction will reduce this by approximately 10%. As the slope increases, however, conventional foundation grading requires an increasing percentage of the building lot:

Table 6-4
ESTIMATED GRADING IMPACT AREA ON LOTS OF VARIOUS SLOPES
(Assumes 2500-3000 sq.ft. home)

Slope of Lot	Area Required For ..... Conventional Pad Grading	Site-Adaptive Foundation (+ reasonable access grading)
12% - 20%	5700 sq.ft.	± 3800 sq.ft.
20% - 30%	Over 9000 sq.ft.	± 4800 sq.ft.
30% plus	Not Feasible	± 8000 sq.ft.

At these steeper slopes, downhill building wall heights could be 30- to 40-feet, and access drives would increase grading impacts further, an estimated additional 1000 to 2000 square feet.

As lot sizes are reduced, graded areas could impact a high percentage of each lot, where sloping land is involved. Taken subdivision-wide, this could create a significant change in the landform. For example, the low-medium density residential designation allows up to 6 dwelling units per acre, or lot sizes of approx. 7000 square feet. As indicated in the preceding table, a high percentage of a lot of this size can be impacted by grading, even in areas of the 12% to 20% slopes common to the Plan area.

Medium-density residential designations allowing up to 10 dwelling units per acre will exacerbate this condition. With lot sizes from 7000 square feet to as low as 4000 square feet, grading impacts can be severe for even modest slopes if project design is not well adapted to site slopes, or limitations are not placed upon the use of mass-pad grading.

Mixed use areas, where the residential component can achieve a density of up to 15 du/ac are also problematic on even modest slopes.

The following Plan residential areas are of concern:

Table 6-5
PLAN AREA RESIDENTIAL AREAS OF CONCERN
(See also Figure 6-3)

Location #	Area	Proposed Designation	Concern
Within City Limits			
2	Area between Hwy 49 and Nevada St, north of Palm Avenue	Mixed Use	Potential for High Density residential development on 5-15% slopes
9	Indian Hill Road	Mixed Use	Potential for High Density residential development on 5-15% slopes.
10	Along Luther Road	ULDR (4 du/ac)	Slopes of 5-15%
11	Marguerite Mine Rd including Auburn Ravine Intersection	ULDR (4 du/ac) MDR (10 du/ac) HDR (5-15 du/ac)	Slopes of 10-30%
Outside of City Limits, Within Existing Sphere of Influence			
12	Mt Vernon, West Bell & Joeger Roads area (NW Sphere)	LDR (1 du/ac)	Slopes ranging to over 30%
Ref: Final EIR, p.50 13	North and South of Foresthill Rd (includes areas G/6O and G/2D)	RDR (.25 du/ac) RDR (~~.5 1/2~~ du/ac) LDR (1 du/ac)	Slopes ranging to over 30%
14	Southern Sphere	RDR (1/2 du/ac) LDR (1 du/ac) ULDR (4 du/ac)	Slopes ranging to over 30%
Within New Sphere of Influence			
12	Mt Vernon, West Bell & Joeger Roads area (NW Sphere)	LDR (1 du/ac)	Slopes ranging to over 30%
13	North and South of Foresthill Rd	RDR (1/2 du/ac) LDR (1 du/ac) ULDR (4 du/ac)	Slopes ranging to over 30%
14	Southern Sphere	RDR (1/2 du/ac) LDR (1 du/ac)	Slopes ranging to over 30%

Conclusion: Based upon the impact evaluation criteria and discussion above impacts are considered to be potentially significant and unmitigatable. (See discussion in mitigation measures section related to infeasibility of mitigation measures.)

2. **Erosion potential.** *IMPACT EVALUATION CRITERIA:* ***Soil erosion becomes a significant adverse impact when construction activities or long-term buildout result in sedimentation which markedly changes the turbidity of receiving waters, significantly impacts fish or wildlife, or if erosion occurs to the point that revegetation of extensive eroded areas will be difficult or create permanent visual scars.***

The RCD report notes that erosion is a problem in much of the area. Erosion potential is always present and occurs when soils are disturbed and protective vegetative cover is removed. A number of factors are considered by the SCS when they assign erosion hazard ratings to predict how soils will erode in relation to specific kinds of land uses and treatment.

The Erosion Potential Map [of the report] lists each of the soils in the Plan area by their propensity to erode. It shows that very high ratings are given to those soils which are in the American River Basin and steeply slope toward the American River. These particular soils are Auburn-Sobrante Rock outcrop complex and are within the administrative jurisdiction of the Bureau of Reclamation. Soils with high erosion potential within the watersheds of Auburn Ravine and North Ravine are Auburn and Boomer Series and are generally in the western portion of these watersheds. The head waters of the Dry Creek Basin contain Josephine and Mariposa as well as Auburn and Boomer Series soils that have high erosion potential. An outcropping of Henneke Rock Outcrop complex occurs just north of the Auburn Airport within the basin.

It is primarily within these hydraulic basins that overgrazing, road construction, shaping of building pads, grading for transportation systems, and construction for utilities are responsible for accelerating erosion. Movement of eroded soil can lead to destruction of wildlife habitat, change the capacity of streams to provide for proper flood control, carry pollutants to streams and rivers, and reduce agricultural and timber production.

The Plan includes several goals and policies targeted to erosion control (See Table 6-1). A key issue related to the effectiveness of these goals, policies, and programs is whether or not they will be implemented. As discussed in the Impacts to Landform section above, the primary concern is projects which will not require discretionary approval or grading permits (these are the key implementing mechanisms). The use of Best Management practices are encouraged in the City of Auburn Plan. However, the use of these practices can be ineffective on large projects during heavy rainfall (the Grading Ordinance does not prohibit winter grading). In addition, though mitigation monitoring of erosion control features is called for in the Plan, the system currently used utilizes the Department of Public Works to monitor implementation of erosion control features on large projects and individual lot development, funded by the developer. Currently, the DPW has a Memo of Understanding with the Resource Conservation District to provide

mitigation monitoring on an as-needed basis. It would be appropriate to formalize these inter-related processes in a specifically formulated implementation program.The Land Use Map generally focuses intensive land uses out of areas of high erosion potential and areas of highest potential are reserved as open space. However, as noted in the Impacts to Landform section, there are some exceptions. Table 6-5 lists areas which have been designated for urban uses in sloping area. These areas will also be of concern from an erosion standpoint. In addition, the following areas are designated for urban uses (defined here as commercial, industrial, lots under two acres in size) in areas of high erosion potential:

Table 6-6
ADDITIONAL AREAS OF EROSION POTENTIAL CONCERN
(see Figure 6-3 for location)

Location #	Area	Proposed Designation	Concern
Existing and New Sphere of Influence			
Ref: Final EIR, p.50 13	North and South of Foresthill Rd (includes areas G/50 and G/2d)	RDR (25 du/ac) RDR (~~5 du/ac 1/2ac lots~~) ULDR (4 du/ac)	Density of development could yield erosion impacts

Conclusion: Based on the above discussion, impacts in these areas are judged to be potentially significant. Mitigation measures are proposed to reduce these impacts to below the significant level.

3. **Seismic hazards.** *IMPACT EVALUATION CRITERIA: **The criteria for significant potential for seismic hazards include the potential location of structures in proximity to Alquist-Priolo mapped fault zones, potential for location of structures within 50 feet of an active fault, or the potential for structures to be exposed to landsliding/rockfall potential due to earth shaking.***

The Resource Conservation District report details several distant Alquist-Priolo fault systems and their potential for movement affecting the Plan area. The San Andreas Fault in San Francisco and the Hayward Fault in the East Bay area are 110 and 94 miles, respectively, from Auburn. Maximum credible earthquakes along these faults projected at magnitude 8.25 for the San Andreas and 7.5 for the Hayward, would produce barely perceptible shock and bedrock acceleration at Auburn (less than 0.05g). The closest identified "potentially active" faults (where movement has occurred within the past two million years), are the Bear Mountain Fault and the Melones Faults, which are situated approximately three to four miles westerly and easterly from Auburn. The closest identified "active fault" (where movement has occurred within the past 11,000 years) is the Cleveland Hills Fault, situated approximately 36 miles northwesterly of Auburn. Active faults located between 50 and 100 miles of the site include the Mohawk Valley Fault, the Stampede Valley Fault,

the Russell Valley Fault, and the Fort Sage Fault; all located northeast of the area.

There are no Alquist-Priolo mapped zones within the Plan area. However, according to Anderson Geotechnical (Canyon View Draft EIR, Planning Concepts, February 1992), the Plan area does lie in an area of low to moderate historic seismicity. Several earthquakes have occurred in the vicinity since 1850 which have produced noticeable ground shaking in the area. Two earthquakes whose epicenters were estimated to be located 40 miles northwest of Auburn occurred in 1909. Their magnitudes were estimated to be in the range of 5.0 to 5.5 on the Richter Scale. The most recent nearby seismic event was the Emigrant Gap earthquake of September 1989 which measured 4.3 on the Richter scale. The October 17, 1989, 7.1 magnitude earthquake centered near San Jose, produced ground shaking as far east as Reno, Nevada. The Oroville earthquake of 1975, which occurred along the Cleveland Hill Fault located approximately 40 miles northwest of the area had a Richter magnitude of 5.6.

One source of geologic literature (Fault Map of California with Locations of Volcanoes, Thermal Springs and Thermal Wells, from the Division of Mines and Geology, 1975) shows that a branch of the Bear Mountain fault zone, trending northwest/southeast is inferred or is located in the Plan area. The Bear Mountain fault zone is one of many branches of the Foothills fault system, a collection of northwest trending, steeply dipping to vertical faults whose major tectonic activity occurred in the late Jurassic (145 to 160 million years ago). This fault system extends approximately 200 miles along the western foothills of the Sierra Nevada. A shear zone associated with the fault system is located five miles east of I-80. Based on studies performed for the Auburn Dam project, portions of the Foothills fault system should be considered potentially active. Trenching was performed along a lineament associated with the Foothills shear zone as a part of the Auburn Dam project performed by Woodward-Cyde Consultants in 1976. The trenching, located northwest of the site along the Spenceville lineament zone, revealed evidence that the latest movement along this fault had occurred within the last 100,000 years. Seismologists have postulated that movement along the Foothills faults could produce a maximum credible Richter magnitude 6.5 earthquake. However, the maximum credible seismic event has a fairly long postulated return period, upward of 1000 years and possibly as long as 100,000 years. The maximum probable earthquake (return period of 100 years) is postulated to have a Richter magnitude of 5.0. Postulated maximum credible bedrock accelerations for the region are less than 0.2g (Greensfelder, 1974) (Anderson Geotechnical, in Canyon View Draft EIR, Planning Concepts, February 1992).

The City of Auburn General Plan details goals and policies aimed at minimizing risks associated with potential seismic activity (See Table 6-1). However, the issue of the hazard associated with the Bear Mountain Fault Zone and where it is actually located within the Plan area remains unresolved.

Conclusion: Based on the evaluation criteria and discussion above, impacts are considered potentially significant but mitigatable.

4. **Landsliding potential / other geologic hazards.** The Resource Conservation District report notes that geologic hazards within the Plan area are presently limited to small slumps, block slides, and landslides within metamorphic rock; slumps, occasional block slides, and erosional gullying within weathered granitic rock; and slumps or small slide within the intensely fractured serpentine. The occurrence of these problems will increase as land values increase and more and more building sites are excavated on natural hillsides. The deeper the excavations, the more the weaknesses of underlying rock masses are exposed for potential failure.

   The City of Auburn General Plan proposes development in varying density and intensity over most of the Plan area. Much of this development will involve hillsides of varying steepness. (See discussion of specific areas of slope concern under Impact #1.) Most of the natural hillsides, and therefore, most of the areas of landsliding concern, will fall within the Sphere of Influence, outside of the City limits.

   The Plan includes goals, policies and programs to address the issue of development with knowledge of the hazards of landsliding. However, these are general in nature (see Table 6-1), and can only be assured of success if specificity is added. Additional requirements, addressing issues of incremental development, as well as those permitting the determination of other geologic hazards such as liquefaction potential, poor foundation support, and hazards related to serpentine soils, are needed.

   The inclusion of these requirements can be expected to result in full evaluation of sites for landsliding and geologic hazard potential prior to construction, and assure appropriately designed grading and building systems to compensate for potential hazards.

Conclusion: Based on the impact evaluation criteria and discussion above, the impacts due to landsliding potential are expected to be potentially significant but mitigatable.

5. **Cumulative impacts — City plus County buildout.** The County's Auburn/Bowman Community Plan is larger than the City's proposed Sphere of Influence and extends northward to the Bear River into topographically sensitive areas having currently low density development. Impacts similar to those discussed under #1, and #2 above will be experienced in these areas. As a result, the cumulative geology/landform related impacts of combined City and County buildout per the proposed Plan are expected to be significant but mitigatable. Though the Auburn/Bowman Community Plan EIR concludes that the related grading impacts of that Plan will be significant and unmitigatable, the impact of the combined plans is considered significant but mitigatable because the City's contribution can be mitigated. (The County's contribution was not expected to be mitigatable because it appears that recommended measures may not be adopted or funded.) In addition, within the Auburn/Bowman area outside the proposed Sphere of Influence, the County is generally not proposing land use densities which would have significant grading impacts.

Conclusion: Based on the evaluation criteria and discussion above, impacts are expected to be significant but mitigatable.

The following text from Final p. 50 resulted from changes made by the Planning Commission to the draft Plan:

The changes made to the City of Auburn General Plan will moderately reduce landform disturbance impacts overall, although certain specific changes will result in increased levels of impact. However, taken as a whole, the revised Plan does not deviate from the original Plan in a way significant enough to change the general levels of impacts expected. The DEIR notes that the mitigations proposed, if rigorously applied, are capable of reducing these impacts, but are similar to measures that have been unpopular in the past. This remains true and therefore, landform disturbance mitigation cannot be assured.

Ref: Final EIR, p.50

Mitigation Measures

1. Landform disturbance

1a. Include in Plan Implementation Measure IVA:

- **All mixed-use development including residential components.**
- **Design guidelines for Mixed Use Areas should provide for variable residential/commercial mix to tailor development to each site.**
- **All projects in these categories should have design review, regardless of size.**

1b. Add to Plan Implementation Measure IVB. Text and graphics to include:

- Development standards based upon relevant specific slope categories.
- All sites having slopes equal to, or in excess of 4% should be addressed within the Hillside Development Ordinance.
- Floor area ratio specifications/implement coverage minimums by slope category.
- Stipulation of percentages of maximum lot area allowed to be padded (Mass-pad grading prohibition)
- Apply standards to all grading operations requiring a permit. (See thresholds for permits recommended in 1d.)
- Sketch-based guidelines illustrating preferred access, siting, and site-adaptive techniques for hillside development.

1c. Add to Implementation VIIA:

- **Text to restrict biotically significant vegetation loss due to avoidable grading impacts.**

1d. Add Implementation Measure calling for revision of Grading Ordinance to:

- **Review grading permits for adherence to Hillside Development Ordinance guidelines**
- **Require grading permits for operations on slopes of 20% or greater that disturb over 10 cubic yards of soil or 1000 sq.ft. of area.**

1e. **Revise land use designation text and add policies to specify the following:**

Table 6-7
SLOPE RELATED RECOMMENDED POLICY REVISIONS

- Medium Density Residential (MDR) and greater density designations not to be utilized in areas exceeding 15% slope (occurs within the City limits – see impact discussion for areas of concern - Table 6-5)

- Urban Low Density Residential (ULDR and greater density designations) not to be utilized in areas exceeding 20% slopes (occurs within the City limits, as well as the existing and new spheres of influence – see impact discussion for areas of concern - Table 6-5).

- No development in areas exceeding 30% slope (occurs within the existing and new Spheres of Influence – see impact discussion for areas of concern - Tables 6-3, 6-5).

- Limit Industrial/Commercial designations to areas of less than 15% slope (occurs within the existing and new Spheres of Influence – see impact discussion for areas of concern Table 6-3).

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1f. Revise Land Use Map to reflect the criteria above as shown below.

Table 6-8
SLOPE/GRADING RELATED MITIGATION MEASURE 1f
RECOMMENDED LAND USE MAP REVISION
(See Figure 6-3 for locations)

Location #	Area	Proposed Designation	Concern	Mitigated Density Recommended
Within City Limits				
1	Auburn Folsom Rd at Maidu	Mixed Use	Potential for High Density Residential development on 5-15% slopes	Open Space on slopes, Commercial on level corner of Maidu Rd
2	Area between Hwy 49 and Nevada St, north of Fulweiler	Mixed Use	Potential for High Density Residential development on 5-15% slopes	No density change. Use of design measures recommended in Nevada St EIR and Land Use section of this EIR
Within City Limits Cont.				
9	Indian Hill Road	Mixed Use	Potential for High Density Residential development on 5-15% slopes	2 du/ac Clustered
10	Along Luther Road	ULDR (4 du/ac)	Slopes of 5-15%	4 du/ac Clustered off steepest slopes (over 10%)
11	Marguerite Mine Rd including Auburn Ravine Intersection	ULDR (4 du/ac) MDR (10 du/ac) HDR (5-15 du/ac)	Slopes of 10-30%	2 du/ac Clustered on slopes less than 10%; Open Space on areas over 20% slope
Ref: Final EIR, p.51 15	Borland Avenue (Area C/11)	Industrial	Potential for large structures on moderate to steep slopes	Add CD/OSP
Outside of City Limits, Within Existing Sphere of Influence				
3	East side of Hwy 49 between Bell and Dry Cr Road	Industrial/Commercial/Mixed Use	Potential for large structures on moderate to steep slopes (5-15%)	No land use change – Add CD to ensure F.A.R. restrictions on slopes over 10%

Table 6-8 (cont.)
SLOPE/GRADING RELATED MITIGATION MEASURE 1f
RECOMMENDED LAND USE MAP REVISION

Location #	Area	Proposed Designation	Concern	Mitigated Density Recommended
Outside of City Limits within Existing Sphere of Influence (Cont.)				
4	Southwest of the Bowman undercrossing Interchange along I-80	Industrial / Commercial	Potential for large structures on moderate to steep slopes (10-15%)	No land use change Add CD/OSP to ensure F.A.R. restrictions on slopes over 10%
5 *Ref: Final EIR, p.52*	East of Highway 49 at Marguerite Mine Road (Includes Area F/2B)	Industrial	Potential for large structures on moderate to steep slopes (10-30%)	No land use change –Add CD/OSP to ensure F.A.R. restrictions on slopes over 10% (Area F/2B to Residential use)
6	Bell Road and New Airport Road	Industrial	Potential for large structures on moderate to steep slopes (5-15%)	(Recommended in Land Use section also Add CD/OSP to ensure F.A.R.restrictions on slopes over 10%
12	Mt Vernon, West Bell & Joeger Roads area (NW Sphere)	LDR (1 du/ac)	Slopes ranging to over 30%	Mt Vernon Area – 2ac Lots recommended in Biotic sect Joeger Rd area – No change, will be addressed by text changes in Mitigation Measure 1e.
13 *Ref: Final EIR, p.52*	North and South of Foresthill Rd (includes area G5D & G/2D)	RDR (.25 du/ac) RDR (~~5 1/2~~ du/ac) LDR (1 du/ac) ULDR (4 du/ac)	Slopes ranging to over 30%	CD/OSP to ensure no 1 du/ac over 10% slopes; no ~~5 1/2~~ du/ac lots over 20% slopes; no development over 30% slopes
14	Southern Sphere	RDR (1/2 du/ac) LDR (1 du/ac)	Slopes ranging to over 30%	Require Clustering in ULDR
Outside of City Limits Within New Sphere of Influence				
6	Bell Road and New Airport Road	Industrial Commercial	Potential for large structures on moderate to steep slopes (5-15%)	Open Space to ensure F.A.R. restrictions on slopes over 10%
7 *Ref: Final EIR, p.53*	East of I-80/Bell Rd Interchange along railroad tracks	Industrial/Commercial; Mixed Use	Potential for large structures on moderate to steep slopes (15-30%)	No land use change – Add CD/OSP to ensure F.A.R. restrictions on slopes over 10%

Table 6-8 (cont.)
SLOPE/GRADING RELATED MITIGATION MEASURE 1f
RECOMMENDED LAND USE MAP REVISION

Location #	Area	Proposed Designation	Concern	Mitigated Density Recommended
Outside of City Limits within New Sphere of Influence (Cont.)				
8	North and South of Ophir Rd	Industrial	Slopes ranging to over 30%	Industrial-Commercial Development-Open Space to protect slopes
12	Mt Vernon, West Bell & Joeger Roads area (NW Sphere)	LDR (1 du/ac)	Slopes ranging to over 30%	Mt Vernon Area – 2 ac Lots recommended in Biotic section Joeger Rd area – No change, will be addressed by text changes in Mitigation Measure 1e.
13	North and South of Foresthill Rd (includes area G50 & G/2D)	RDR (25 du/ac) RDR (~~5 1/2~~ du/ac) LDR (1 du/ac) ULDR (4 du/ac)	Slopes ranging to over 30%	CD/OSP to ensure no 1 du/ac over 10% slopes; no ~~5 1/2~~ du/ac lots over 20% slopes; no development over 30% slopes
14	Southern Sphere	RDR (~~5 1/2~~ du/ac) LDR (1 du/ac)	Slopes ranging to over 30%	Require Clustering in ~~U~~LDR

Ref: Final EIR, p.53

Effectiveness of Measures: These measures if rigorously applied are expected to reduce landform disturbance to a less than significant level. However, measures such as these are often controversial, and increased funding for additional grading permit review may not be available. In this event, the measures would be unlikely to successfully mitigate impacts below the level of significance.

Implementation: Revisions to final Plan

Mitigation Monitoring: Annual Plan progress report

2. Erosion potential

2a. See measures under 1, above.

2b. Include measure calling for revision of Grading Ordinance to:

a) Allow for the prohibition of grading on projects in all land use designations occupying environmentally-sensitive, steep or exceptionally erodible sites, using the following criteria: projects or grading which will occur on slopes over 20%

OR

which will disturb over 100 cubic yards

OR

exposure of more than 10,000 sq.ft. of soil except on slopes over 8% which should use a lower threshold of 25 cubic yards

OR

1000 sq.ft. of disturbance.

b) **Develop a Memorandum of Understanding specifically outlining the Department of Public Works responsibilities in erosion control mitigation monitoring and provisions for fee collection.** Individual lot development should not be deleted from this system since cumulatively, significant impacts could result.

2c. **The areas described on Table 6-5** should be redesignated as described.

Effectiveness of Measures: The above measures are expected to reduce erosion impacts to below the level of significance.

Implementation: Revisions in final Plan

Mitigation Monitoring: Annual Plan progress report

3. **Seismic hazards**

3a. **Add implementation measure calling for individual site review for fault location within potential Bear Mountain fault branch.** The presence of this inferred fault zone within the Plan area Sphere needs to be confirmed or discounted and a standard of project review/mitigation determined for the potential fault zone based on sound professional advice. Until a study is complete, a "zone of seismic concern" should be established and all sites requiring discretionary permits as well as individual building permits on lots not previously surveyed should be surveyed for fault traces by a registered engineering geologist and recommendations adhered to.

3b. **Add measure calling for a detailed geotechnical report during the environmental review process for public and private developments in high hazard areas, completed by a registered geologist or other qualified specialist.**

3c. **Require a soils report on all building permits and grading permits within areas of known slope instability or where significant potential hazard has been identified.**

Effectiveness of Measures: If the fault zone or other geologic hazards are verified through individual studies or as an overall study is prepared, building setbacks or other standard geotechnical practices are the likely solution to be recommended. This would be a feasible measure; as a result, impacts are expected to be mitigated below the significant level.

Implementation: Revisions in final Plan

Mitigation Monitoring: Annual Plan progress report

4. Impacts from landsliding. See Measures 3a-c above.

5. Cumulative City and County Buildout. See Measures 1,2,3.

Effectiveness of Measures: These measures are expected to reduce the cumulative impacts of combined City buildout including the proposed Sphere of Influence with development on the remainder of the current Auburn/Bowman Community Plan area below the significant level.

Implementation: Revisions to final Plan.

Mitigation Monitoring: Annual Plan progress report

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